

## **Novel multiwavelength L-Band Brillouin-Erbium fiber laser utilizing double-pass Brillouin pump preamplified technique**

### **ABSTRACT**

We experimentally demonstrate successful operation of an enhanced multiwavelength L-band Brillouin–erbium fiber laser and analyze its performance under various operating conditions. This scheme utilizes double-pass amplification technique to preamplify the Brillouin pump (BP) power within the laser cavity before entering the single-mode fiber. Owing to this double-pass preamplification within the erbium gain medium, the proposed laser structure is able to operate at low pumping power and exhibits a low-threshold power of 15.9 mW. Moreover, the double-pass preamplification of BP is able to shift the unstable operation of the laser to a higher pump power, enabling us to generate high power laser signals. We experimentally show that the proposed novel setup can produce up to 30 channels at 40 and 0.035 mW of 1480 nm pump and BP powers, respectively. An obvious suppressant for unstable self-lasing cavity modes because of the effect of homogenous saturation of the erbium-doped fiber gain due to the high intensity of BP is observed in the laser cavity configuration.

**Keyword:** Brillouin scattering; Erbium; Nonlinear optics; Optical fiber lasers